Novel Instrumentation for Rocket Propulsion Systems, Phase I

Completed Technology Project (2007 - 2008)

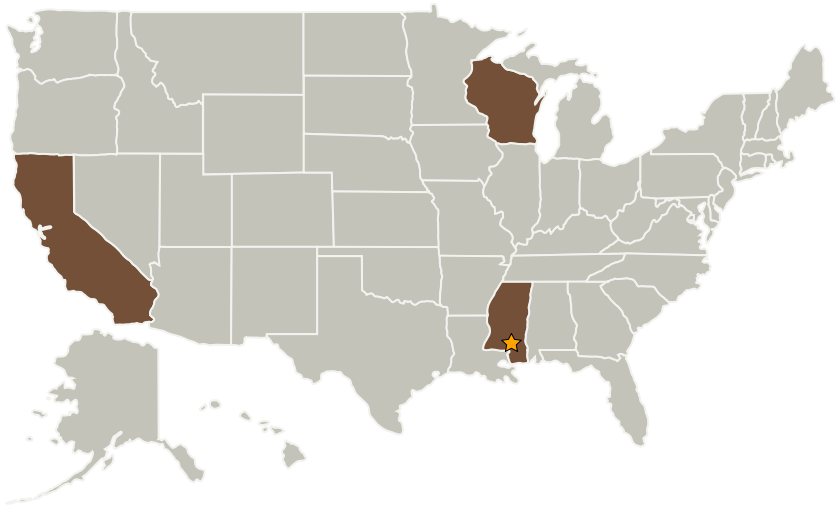
Project Introduction

The objective of the proposed SBIR Phase I program is to develop novel laser-based instruments that provide rapid, in situ, simultaneous measurements of gas temperature, velocity and mole fractions of several important species in rocket plume exhaust flows at NASA Stennis Space Center. Based on laser absorption spectroscopy techniques, the instrument will employ room temperature near-IR and mid-IR lasers to determine the concentrations of several combustion products, pollutants and unburned hydrocarbons with high sensitivity. The Phase I instrument will be demonstrated in combustion flows at University of Wisconsin-Madison Engine Laboratory, at LGR and at a NASA test facility. The fast response of the instrument will enable engineers and scientists to record precise measurements gasdynamic parameters in rocket engine flows to identify temperature and species nonuniformities, combustion instabilities and to refine and improve computational models.

Anticipated Benefits

Non-NASA Commercial Applications include: Instrumentation for measurements, control and thus optimization of combustion engine flows (gas turbines, waste incinerators) based on measurements of gas concentrations, temperatures and velocities. Instrumentation for measurements in rocket engine and gas turbine engine flows that will enable NASA scientists and engineers to monitor gas concentrations, temperatures and velocities under realistic engine operating conditions.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Stennis Space Center (SSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Stennis Space Center(SSC)	Lead Organization	NASA Center	Stennis Space Center, Mississippi
Los Gatos Research	Supporting Organization	Industry	Mountain View, California
University of Wisconsin-Madison	Supporting Organization	Academia	Madison, Wisconsin

Primary U.S. Work Locations	
California	Mississippi
Wisconsin	

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
William W St. Cyr

Principal Investigator:
Douglas Baer

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.5 Propulsion Flowpath and Interactions